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INT CL[5] G06F
On-line databases :WPI

(54) Building maintenance management system

(57) A work target/classification registration section (11), a standard work registration section (12), an on-site work target registration section (13), an on-site execution specifications-forming section (15), a work date data forming section (16), an order file (14), an on-site work execution calendar file (17), and an on-site work execution cycle file (18) form work schedule information including a work target on site, time required for the work, and the number of workers required. A worker registration section (21), an on-site worker registration section (23), an order file (14), an on-site work execution calendar file (17), an on-site work execution cycle file (18), and an on-site daily attending worker registration section (24) provide information representing intervals in which the respective workers are able to work. A worker assignment determination/instruction note transfer section collates the work schedule information with the worker information, and selects workers required for each site, and transfers a code of each selected worker and work schedule information thereof to a corresponding site.

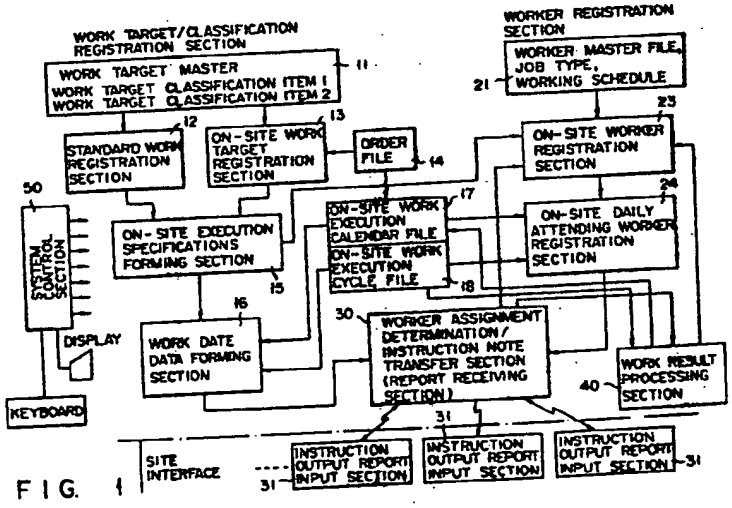


FIG. 1

This print incorporates corrections 9/23/05, EAST Version: 2.0.1.4

GB 2 242 292 A

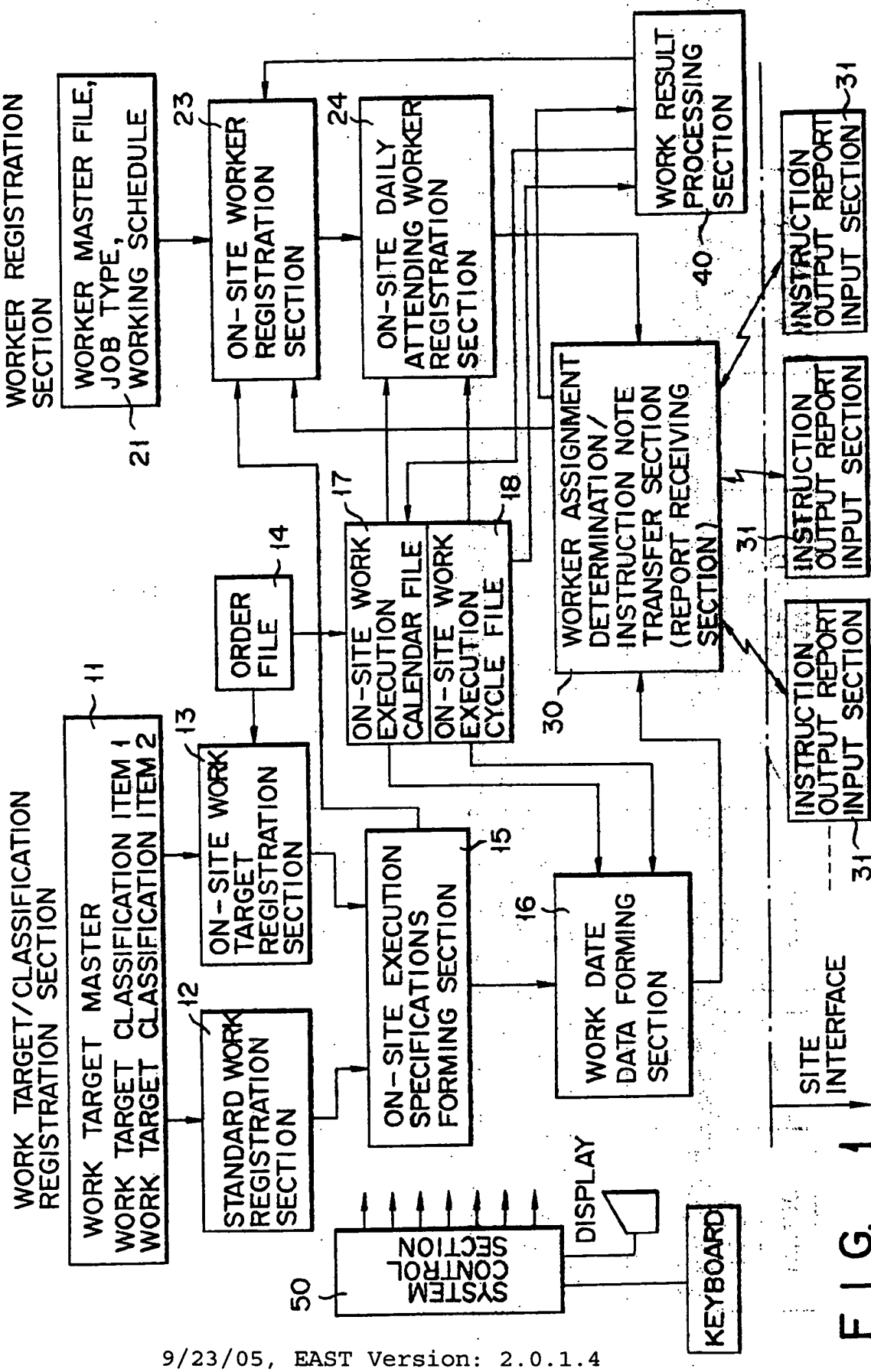

WORK TARGET/CLASSIFICATION REGISTRATION SECTION
WORK TARGET MASTER
WORK TARGET CLASSIFICATION ITEM 1
WORK TARGET CLASSIFICATION ITEM 2
11
ON-SITE WORK TARGET REGISTRATION SECTION
13
STANDARD WORK REGISTRATION SECTION
12
ON-SITE EXECUTION SPECIFICATIONS FORMING SECTION
15
WORK DATE DATA FORMING SECTION
16
SYSTEM CONTROL SECTION
50
DISPLAY
KEYBOARD
ORDER FILE
14
ON-SITE WORK EXECUTION CALENDAR FILE
17
ON-SITE WORK EXECUTION CYCLE FILE
18
WORKER REGISTRATION SECTION
WORKER MASTER FILE, JOB TYPE, WORKING SCHEDULE
21
ON-SITE WORKER REGISTRATION SECTION
23
ON-SITE DAILY ATTENDING WORKER REGISTRATION SECTION
24
WORKER ASSIGNMENT DETERMINATION/ INSTRUCTION NOTE TRANSFER SECTION (REPORT RECEIVING SECTION)
30
WORK RESULT PROCESSING SECTION
40
INSTRUCTION OUTPUT REPORT INPUT SECTION
31
INSTRUCTION OUTPUT REPORT INPUT SECTION
31
INSTRUCTION OUTPUT REPORT INPUT SECTION
31
SITE INTERFACE

FIG. 1

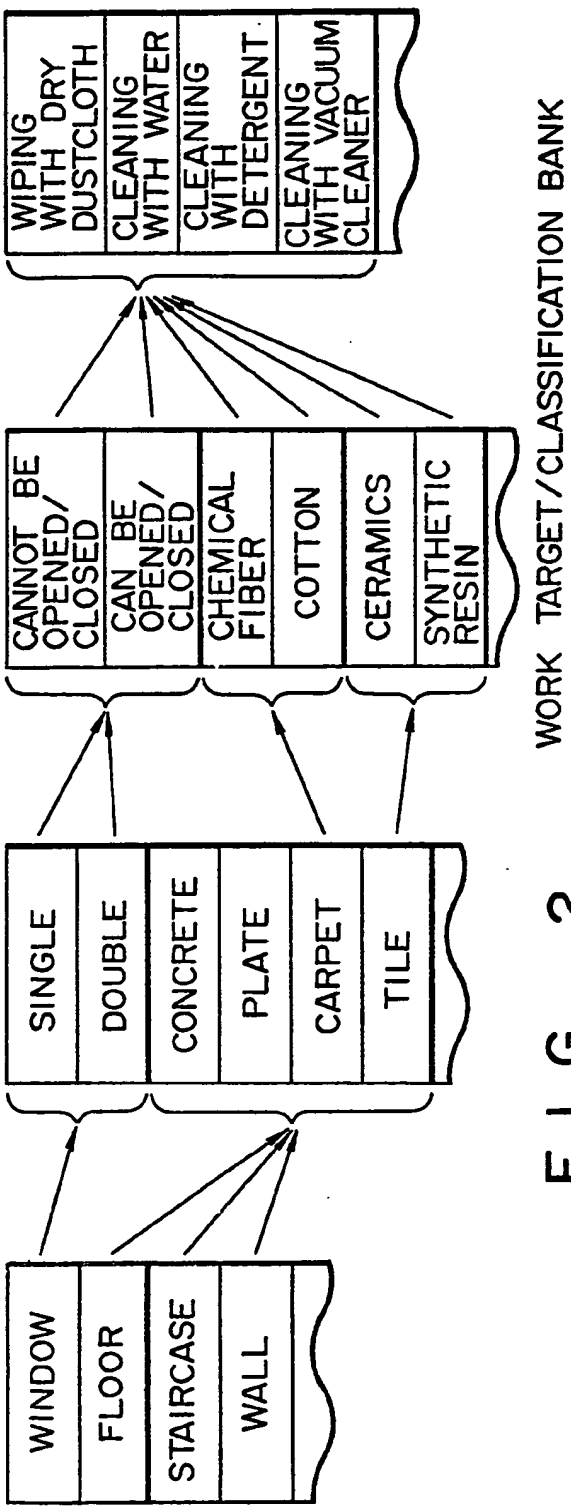


FIG. 2

FLOOR	CONCRETE		CLEANING WITH WATER	STANDARD WORKING TIME
FLOOR	PLATE		WIPING WITH DRY DUSTCLOTH	STANDARD WORKING TIME
FLOOR	CARPET	CHEMICAL FIBER	CLEANING WITH VACUUM CLEANER	STANDARD WORKING TIME
		↓	↓	↓
		STANDARD WORK DATA 1	STANDARD WORK DATA 2	STANDARD WORK DATA 3

FIG. 3

SITE: ID INFORMATION

ON-SITE WORK INFORMATION

BUILDING	FLOOR LEVEL	WORK TARGET	ITEM 1	ITEM 2	ITEM 3	AREA m^2	DATE	CYCLE	TIME ZONE
A1	FIRST FLOOR	FLOOR	CONCRETE		CLEANING WITH WATER	500	EVERY DAY		17:00~20:00
	SECOND FLOOR	FLOOR	CARPET	CHEMICAL FIBER	CLEANING WITH VACUUM CLEANER	250		SATURDAY	17:00~20:00
	FIRST FLOOR	WINDOW	SINGLE	CANNOT BE OPENED/ CLOSED	CLEANING WITH WATER	500	EVERY DAY		17:00~20:00
	SECOND FLOOR	WINDOW	SINGLE	CAN BE OPENED/ CLOSED	WIPING WITH DRY DUSTCLOTH	250		THURSDAY	17:00 20:00
	BASE-MENT	POWER SOURCE EQUIPMENT						SATURDAY	17:00~20:00
A2									

ON-SITE WORK TARGET MASTER FILE

FIG. 4

9/23/05, EAST Version: 2.0.1.4

BUILDING	FLOOR LEVEL	WORK TARGET	ITEM 1	ITEM 2	ITEM 3	WORKING TIME	NUMBER OF WORKERS	WEIGHTING	DATE	CYCLE
A1	FIRST FLOOR	FLOOR	CONCRETE		CLEANING WITH WATER	18:00~ 20:00	X 1		EVERY DAY	
	SECOND FLOOR	FLOOR	CARPET	CHEMICAL FIBER	CLEANING WITH VACUUM CLEANER	17:00~ 19:00	X 4	5		SATURDAY
	FIRST FLOOR	WINDOW	SINGLE	CANNOT BE OPENED/ CLOSED	CLEANING WITH WATER	17:00~ 18:00	0		EVERY DAY	
	SECOND FLOOR	WINDOW	SINGLE	CAN BE OPENED/ CLOSED	WIPING WITH DRY DUSTCLOTH					THURSDAY
	BASEMENT	POWER SOURCE EQUIPMENT				19:00~ 20:00	1	10		SATURDAY

FIG. 5

BUILDING	FLOOR LEVEL							
A1	FIRST FLOOR	WORKER H1	WORKER H2	WORKER H3	WORKER H4	. . .	. . .	. . .
	SECOND FLOOR	WORKER H1	WORKER H2	WORKER H4	WORKER H3	. . .	. . .	. . .
	FIRST FLOOR	WORKER H4	WORKER H2	WORKER H3	WORKER H1	. . .	. . .	. . .
	SECOND FLOOR	WORKER H4	WORKER H2	WORKER H3	WORKER H1	. . .	. . .	. . .
	BASE-MENT	WORKER H3	WORKER H1	. . .	. . .	. . .	. . .	. . .

FIG. 6

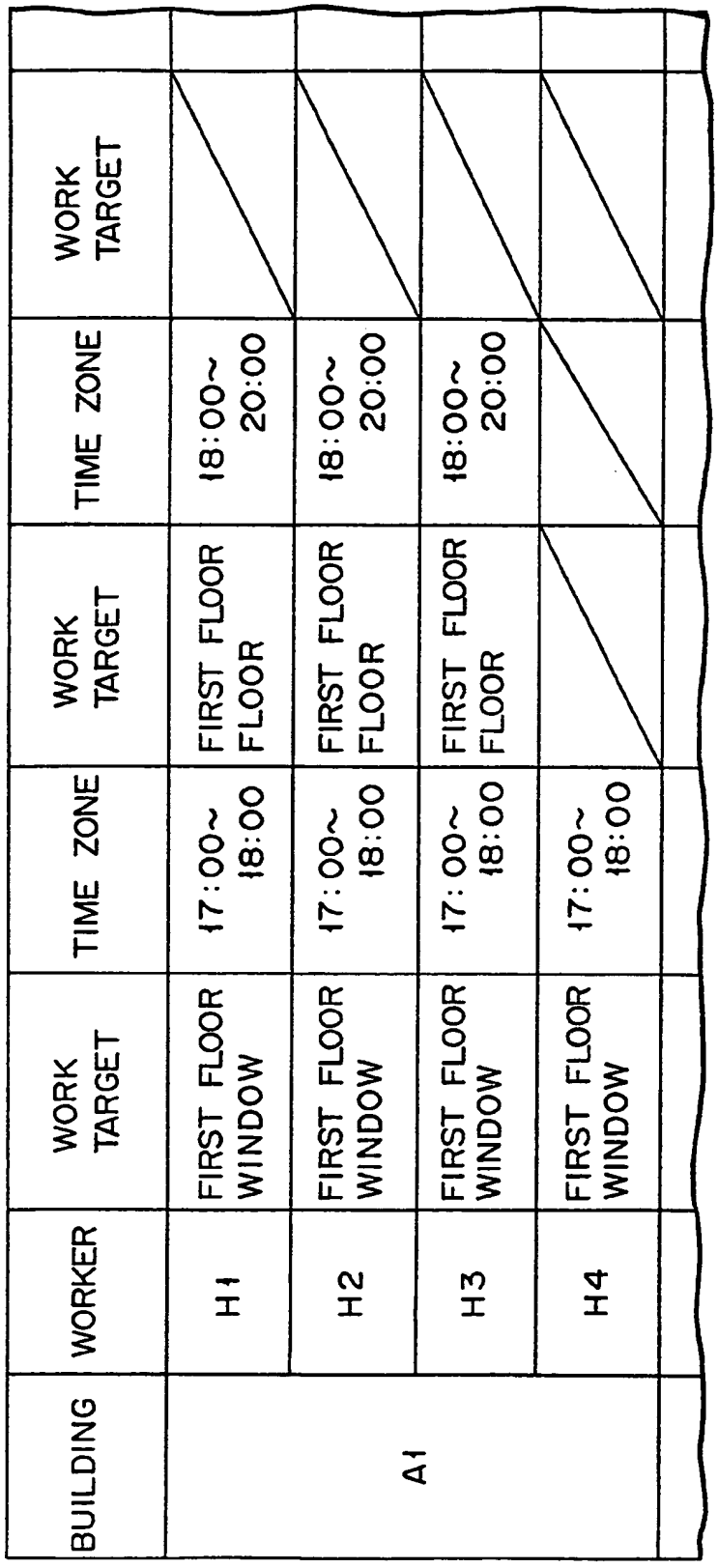
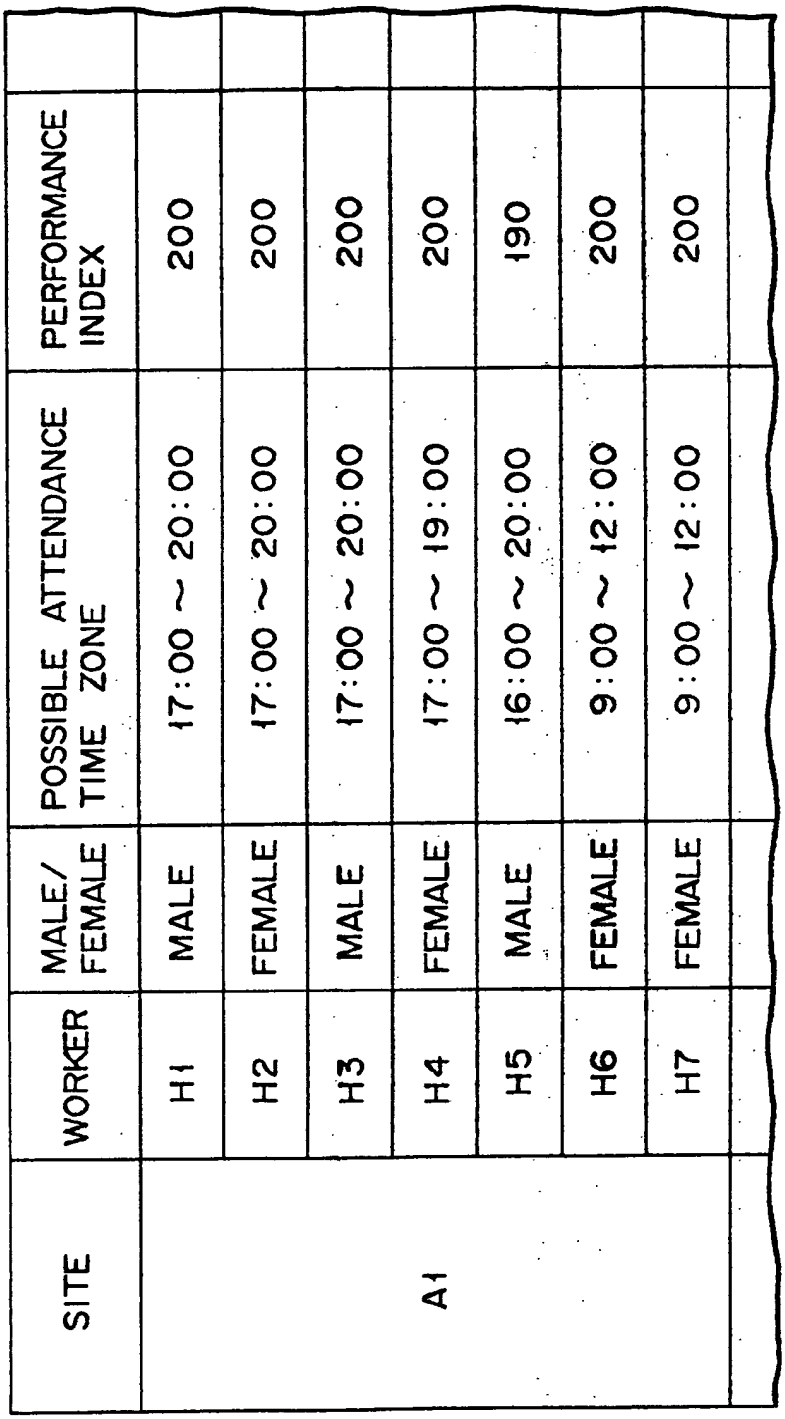

BUILDING
WORKER
WORK TARGET
TIME ZONE
WORK TARGET
TIME ZONE
WORK TARGET
A1
H1
FIRST FLOOR WINDOW
17:00~ 18:00
FIRST FLOOR FLOOR
18:00~ 20:00
H2
FIRST FLOOR WINDOW
17:00~ 18:00
FIRST FLOOR FLOOR
18:00~ 20:00
H3
FIRST FLOOR WINDOW
17:00~ 18:00
FIRST FLOOR FLOOR
18:00~ 20:00
H4
FIRST FLOOR WINDOW
17:00~ 18:00

FIG. 7



SITE	WORKER	MALE/ FEMALE	POSSIBLE ATTENDANCE TIME ZONE	PERFORMANCE INDEX	
A1	H1	MALE	17:00 ~ 20:00	200	
	H2	FEMALE	17:00 ~ 20:00	200	
	H3	MALE	17:00 ~ 20:00	200	
	H4	FEMALE	17:00 ~ 19:00	200	
	H5	MALE	16:00 ~ 20:00	190	
	H6	FEMALE	9:00 ~ 12:00	200	
	H7	FEMALE	9:00 ~ 12:00	200	

FIG. 8

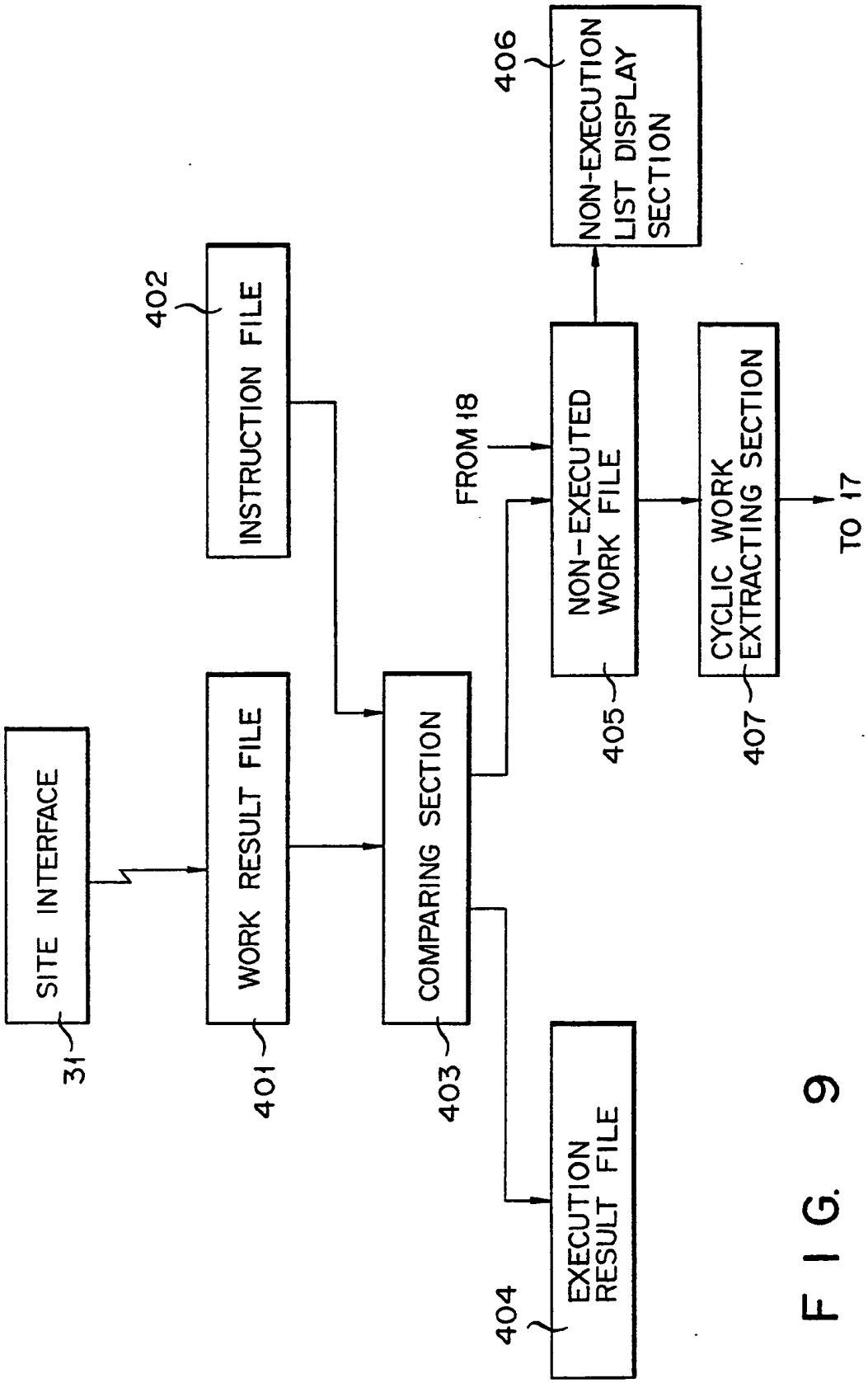

SITE INTERFACE
31
WORK RESULT FILE
401
INSTRUCTION FILE
402
COMPARING SECTION
403
EXECUTION RESULT FILE
404
FROM 18
NON-EXECUTED WORK FILE
405
NON-EXECUTION LIST DISPLAY SECTION
406
CYCLIC WORK EXTRACTING SECTION
407
TO 17

FIG. 9

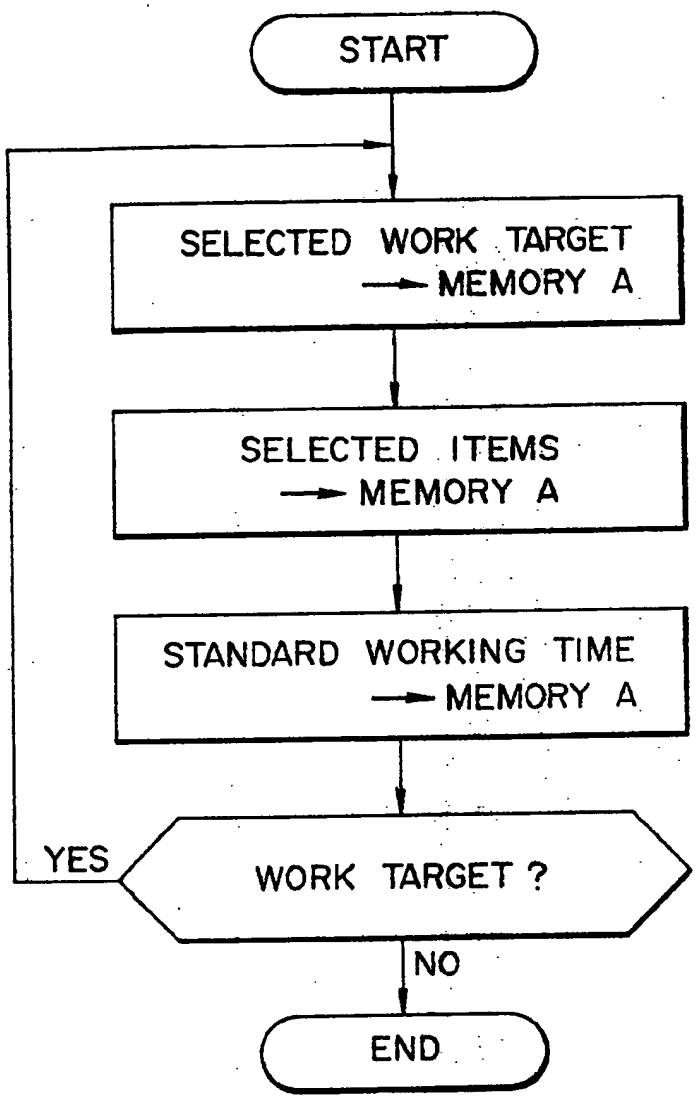
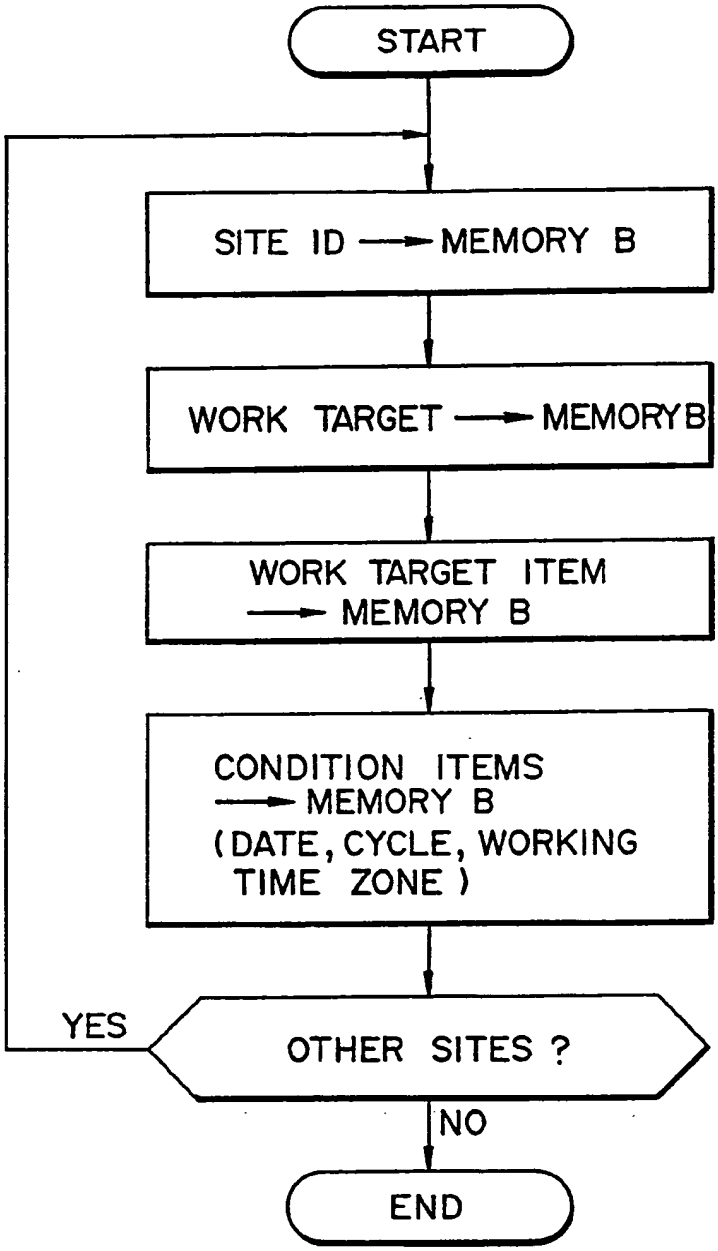
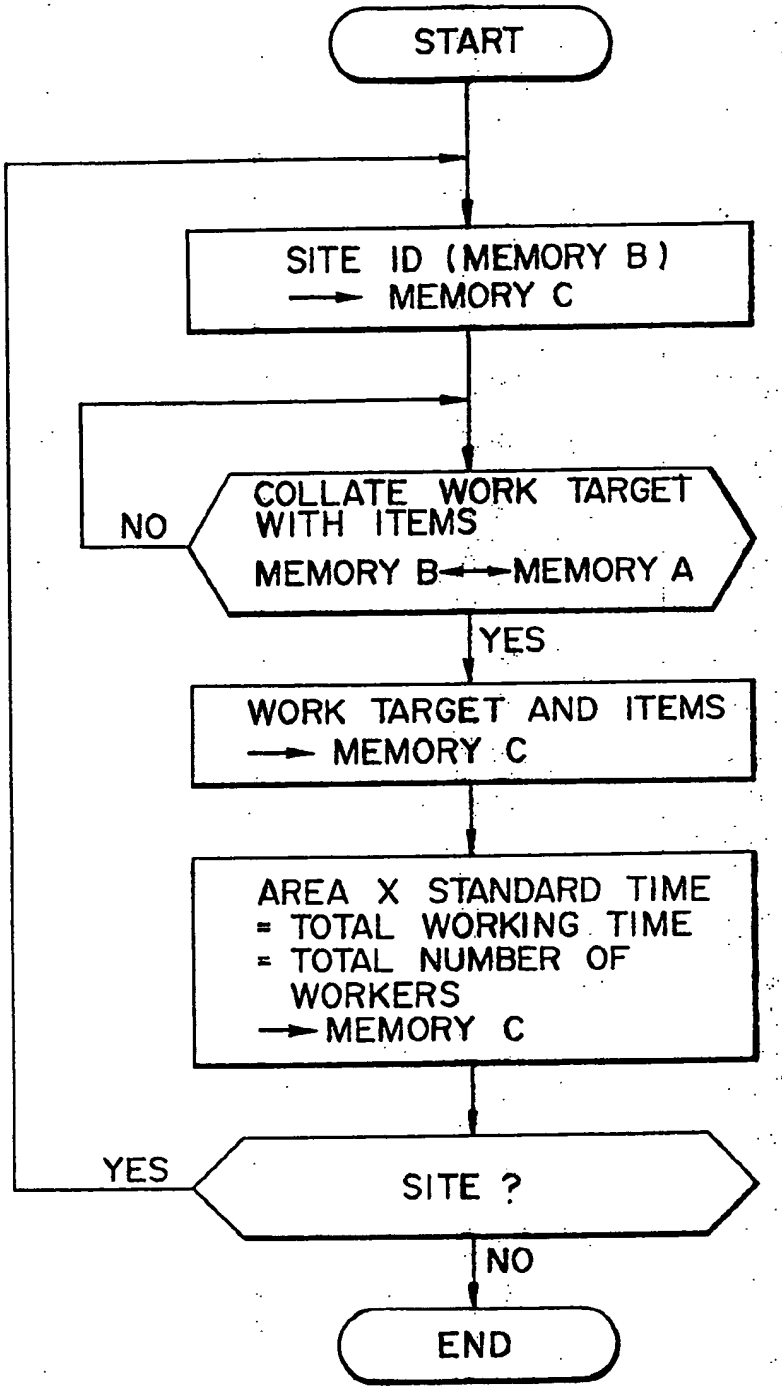

START
SELECTED WORK TARGET
→ MEMORY A
SELECTED ITEMS
→ MEMORY A
STANDARD WORKING TIME
→ MEMORY A
YES
WORK TARGET ?
NO
END
STANDARD WORK REGISTRATION SECTION

FIG. 10



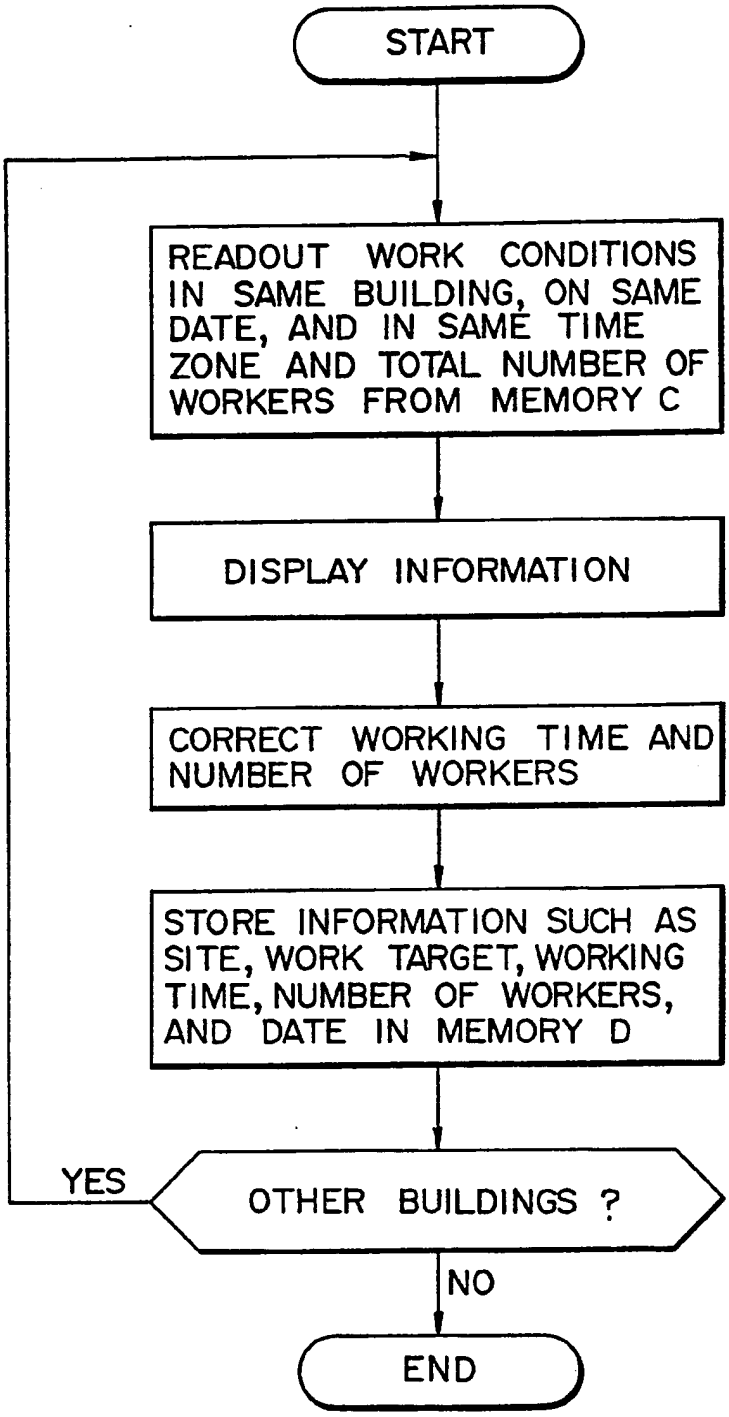
ON-SITE WORK TARGET REGISTRATION SECTION

FIG. 11



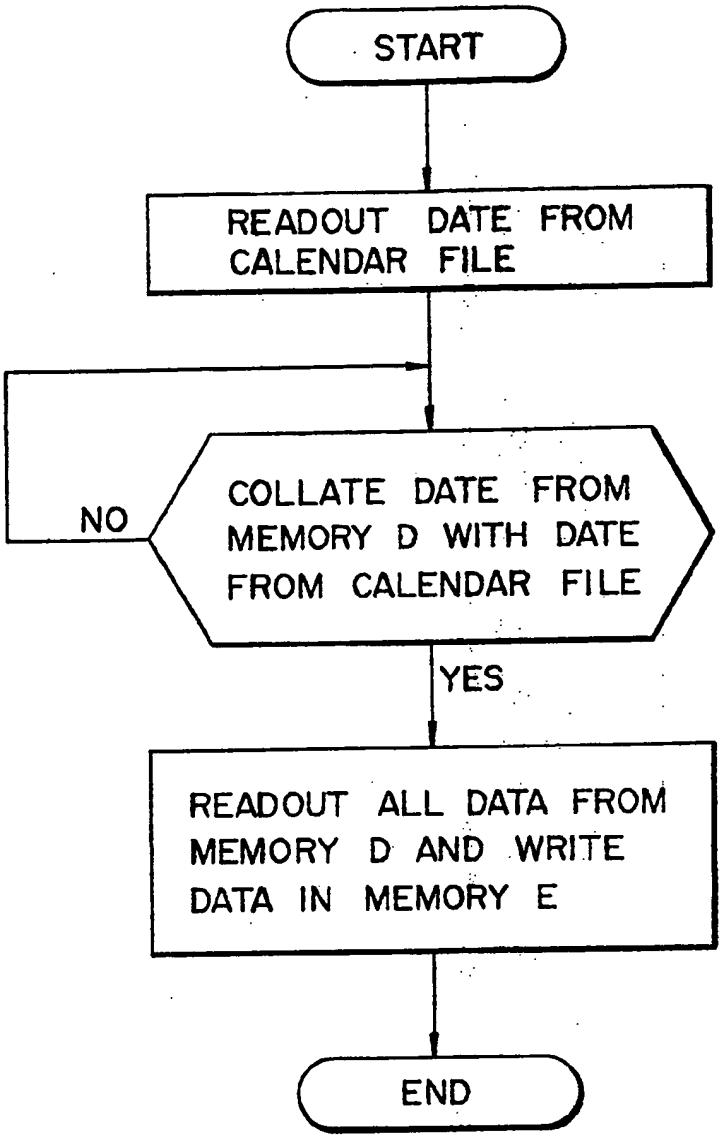
ON-SITE EXECUTION SPECIFICATIONS 1

FIG. 12



ON-SITE EXECUTION SPECIFICATIONS II

FIG. 13



FORMATION OF WORK DATE DATA

FIG. 14

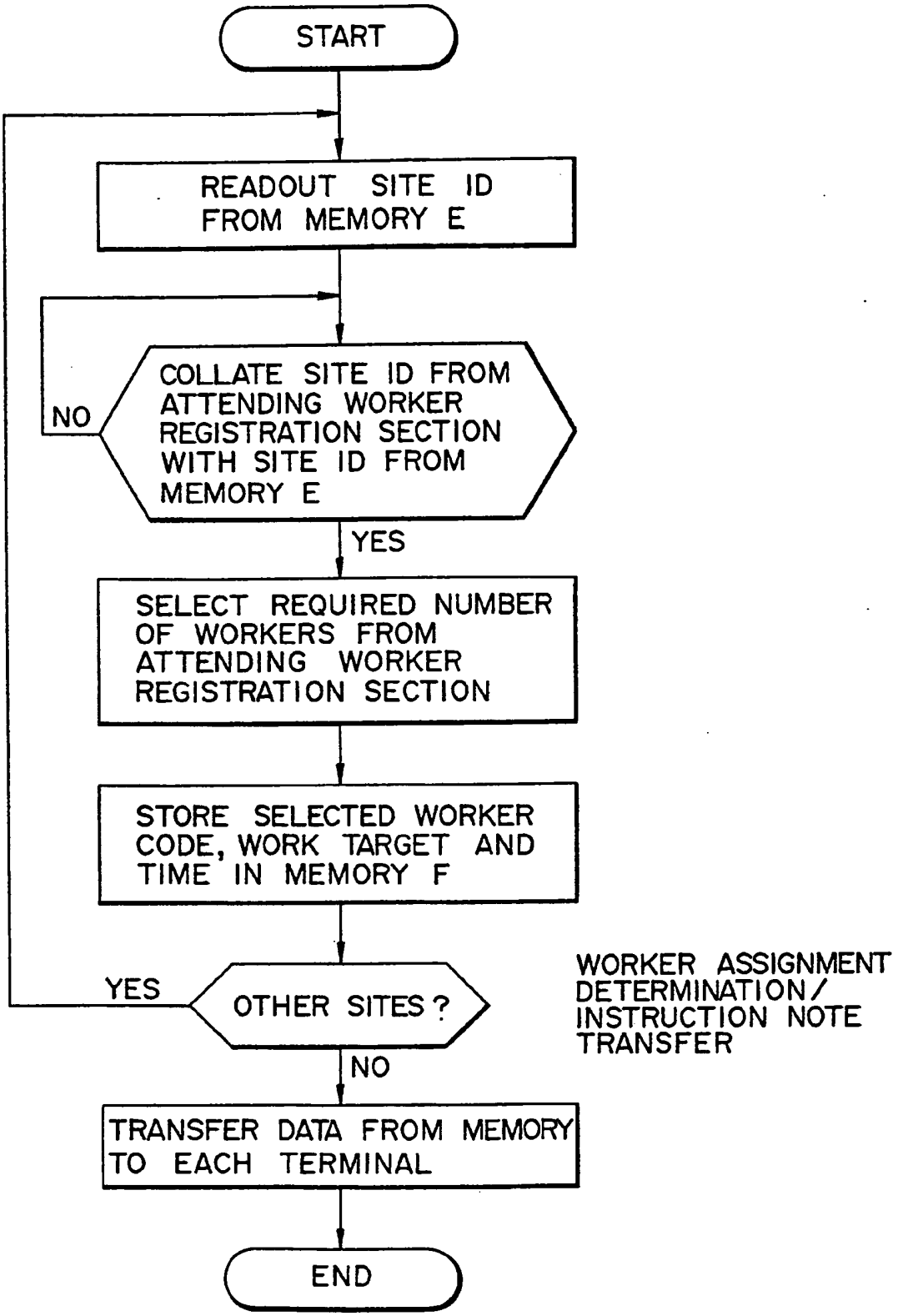

START
READOUT SITE ID FROM MEMORY E
COLLATE SITE ID FROM ATTENDING WORKER REGISTRATION SECTION WITH SITE ID FROM MEMORY E
NO
YES
SELECT REQUIRED NUMBER OF WORKERS FROM ATTENDING WORKER REGISTRATION SECTION
STORE SELECTED WORKER CODE, WORK TARGET AND TIME IN MEMORY F
OTHER SITES ?
YES
NO
TRANSFER DATA FROM MEMORY TO EACH TERMINAL
END
WORKER ASSIGNMENT DETERMINATION/ INSTRUCTION NOTE TRANSFER

FIG. 15

"BUILDING MAINTENANCE MANAGEMENT SYSTEM"

The present invention relates to a building maintenance management system which can supply proper instruction notes to workers who perform cleaning, maintenance, and inspection of a building.

When instructions of work contents are to be given to workers who perform cleaning, maintenance, and inspection of a building, work instruction notes are handed to the respective workers sufficiently before a day on which work is to be done. Assignment of workers is performed by a manager by referring to a master file in which required work items and work request date on each site are written and a schedule master file associated with workers.

Recently, however, since building maintenance requires cumbersome work items, and the needs of the owners of buildings vary, it is difficult to form an optimal work plan and to give instructions for an efficient work sequence to workers. In addition, formation of a work plan requires a long period of time. Furthermore, as the number of workers and the number of work items are increased, checking of a work result becomes difficult.

If the needs of the owners are changed or the number of workers is changed, corresponding worker assignment or work planning cannot be immediately performed by currently available systems. In addition,

no management methods are available which can respond to a wide variety of ratios of employed workers to quitted workers and qualities of workers and working times.

As described above, in conventional building management, a proper, precise plan cannot be immediately obtained. In addition, it is difficult to check a result, i.e., whether work is done in accordance with instructions.

It is, therefore, an object of the present invention to provide a building maintenance management system which can reliably supply proper work contents on each site to each worker.

It is another object of the present invention to provide a system which is suitably used to automatically correct a work plan for the following day when the working time of a worker is changed.

It is still another object of the present invention to provide a management system which allows easy use of work result data and can be suitably used to form standard values (a standard time required for each work, a standard working time for each type of work, a standard working time for each building, and the like) after the work is done.

It is still another object of the present invention to provide a management system which can be effectively used when diagnosis (appropriateness of the number of

workers, working times, and the like) on each site is to be performed by using work standard values and when estimation data for a new building management request is to be formed.

In order to achieve the above objects, there is provided a building maintenance management system comprising means for forming work schedule information for each site, the work schedule information including a work target on a site, a time required for the work, and a required number of workers, means for forming workers information representing workers who can work on each site, the worker information including time information representing time intervals in which the respective workers can work, and means for selecting workers and transferring an instruction note, said means collating the work schedule information with the worker information, selecting workers required for each site from the worker information, and transferring a code of each selected worker and work schedule information thereof to a corresponding site.

With above-described means, when workers attend a predetermined site, they can receive proper instruction notes printed out from a printer. This prevents omissions of work due to a failure to record data of some work items. In addition, by sending work end information to the center through terminals, a work result can be checked.

This invention can be more fully understood from the following detailed description when taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a block diagram showing an arrangement of an embodiment of the present invention;

Fig. 2 is a view showing a data format of a work target/item registration section;

Fig. 3 is a view showing a data format of a standard work registration section;

Fig. 4 is a view showing a data format of an on-site work target registration section;

Fig. 5 is a view showing a data format of an on-site execution specifications forming section;

Fig. 6 is a view showing a data format used in an on-site worker registration section in Fig. 1;

Fig. 7 is a view showing a data format used in a worker assignment determination/instruction note transfer section in Fig. 1;

Fig. 8 is a view showing a data format used in the on-site worker registration section;

Fig. 9 is a block diagram showing a detailed arrangement of a work result processing section in Fig. 1;

Fig. 10 is a flow chart of a program used in the standard work registration section;

Fig. 11 is a flow chart of a program used in the on-site work target registration section;

Figs. 12 and 13 are flow charts of programs used in the on-site execution specifications forming section;

Fig. 14 is a flow chart of a program used in a work date data forming section; and

Fig. 15 is a flow chart of a program used in the worker assignment determination/instruction note transfer section.

An embodiment of the present invention will be described below with reference to the accompanying drawings.

Fig. 1 shows an embodiment of the present invention.

Referring to Fig. 1, reference numeral 11 denotes a work target/classification registration section including a work target registering section and work target classification items 1 and 2.

In the work target registration section, standardized name and codes of all the work targets are registered. For example, "floor" "door", "window", and the like are used for cleaning; "heat source unit", "substation equipment", "information processing unit", "office automation equipment", and the like, for equipment management; and "monitor", "key", and the like for security.

The work contents of identical work targets may vary due to a difference between materials and

structures. Therefore, standardized names and codes of materials and structures are registered in an item as a work target classification item 1 for classifying such identical work targets.

With regard to work targets requiring further classification, standardized names and codes are registered in items for classifying such work targets.

Fig. 2 shows work targets and classification items 1, 2, and 3 as examples.

For example, "floor" as a work target may be constituted by concrete, a carpet, tiles, or a plate material. In addition, a carpet includes chemical fiber or cotton. Job contents include a case wherein only water is used, a case wherein a detergent is used, and a case wherein only wiping is performed by simply using a dry dustcloth.

The embodiment will be described below by referring to Fig. 1 again.

In a standard work registration section 12, contents of the work target and the work target classification items 1, 2, and 3 are combined to form one work as a piece of information (to be referred to as work information). That is, work information is formed as data including a work target and work target items. In addition, work information includes a work target name to be printed on a work instruction note, and standard working time information of a corresponding work.

A work information code is appended to each work information formed in this manner. Such work information is stored as standard work information in the standard work registration section 12.

A standard working time is in minutes, and is calculated per worker. In order to calculate the standard amount of a work target, the specific unit amount of the work target, e.g., one square meter or one unit, is considered as "1".

Fig. 3 shows a case wherein different pieces of standard work information are formed with regard to "floor" cleaning.

This case will be described below by referring to Fig. 1 again.

Reference numeral 13 denotes an on-site work target registration section.

Work targets, work target classification items, and the like are input from an order file 14 to the on-site work target registration section 13. In the on-site work target registration section 13, the information input from the order file 14 is collated with information input from the work target/classification registration section 11 to pick up work targets and items requested on sites, thus forming on-site work information for the respective sites.

Fig. 4 shows a format of this one-site work information.

Site ID information includes codes identifying floors of a building. In addition to work information, each on-site work information includes area information and information of the number of units read out from the order file 14. The order file 14 stores time periods in which operations of work targets can be performed, dates on which works are performed, and data of work cycles, in addition to the site ID information. These pieces of information are also appended to the one-site work information.

The standard work information from the standard work registration section 12 and the on-site work information from the on-site work target registration section 13 are sent to an on-site execution specifications forming section 15.

In the on-site execution specifications forming section 15, working times for the respective sites are calculated by using the on-site work information and the standard work information. This working time information is added to the site ID information.

That is, a working time can be calculated by multiplying an area in Fig. 4 by a standard time in Fig. 3.

In the on-site execution specifications forming section 15, work schedule information for efficient operations is formed for each work target. Each work schedule information includes various conditions

required to actually do a work on a site, e.g., a required number of workers, a sequence of operations, and a working time. Some work may require workers having special skills and qualifications.

Referring to, e.g., work information for a building A1 in Fig. 4, windows and floors on the first floor must be cleaned every day. These work targets have the same time zone in which cleaning can be performed. In addition, the windows are to be cleaned with water. Therefore, if the floors are cleaned after the windows are cleaned, the floors are caused to be dirty due to the cleaning of the windows.

In such work conditions, the windows are cleaned before the floors are cleaned.

Subsequently, the number of workers to be sent to the site is calculated. The number (X1) of workers required to finish cleaning of the windows within the assigned period of time is calculated. The number (X2) of workers required to finish cleaning of the floors within the assigned period of time is calculated. The number of workers required to successively clean the windows and the floors is then calculated. If the number (X2) of workers required for the cleaning of the floors is equal to the number (X1) of workers required for the cleaning of windows, the number of workers to be sent to the site is X1. However, if X2 > X1, the number of workers to be sent to the site should be

X1 + (X2 - X1). In contrast to this, if X2 < X1, the number of workers to be sent to the site is X1. In this case, if these workers successively clean the windows and the floors, the working time can be shortened.

Referring to the work information for the building A1 in Fig. 4 again, on Saturdays, "floor" cleaning on the second floor and inspection of power source equipment on the basement are to be performed in the same time zone. Assume that the floors are cleaned by using vacuum cleaners or using elevators. In this case, if inspection of the power source equipment is started, and interruption of the power source occurs, cleaning of the floors cannot be performed, and the elevators are stopped. In such work conditions, time zones are assigned such that cleaning of the floors is performed earlier than inspection of the power source equipment.

Fig. 5 shows a data format of a work schedule, in which detailed working time information and information of the number of workers to be sent are added to each work information. Referring to Fig. 5, the number of workers for the windows on the first floor is set to be 0 because the workers for the floors on the first floor successively clean the windows.

In addition, significance data (weighted information) is added to each work schedule data in the on-site execution specifications forming section 15. This weighted information is used when the number of workers

to be sent to the building A1 is calculated after workers are assigned to another building, and a shortage of workers occurs. That is, weighted information is used to sequentially assign workers to works in the order of decreasing significance.

For example, as in the schedule shown in Fig. 5, if the inspection of the power source equipment and the "floor" cleaning on the second floor are to be performed on Saturdays, a weight of, e.g., 10 is assigned to the inspection of the power source equipment, and a weight of 5 is assigned to the "floor" cleaning. This weighted information ranges from "10" to "1". When a work is order, such weighted information (not shown in Fig. 4) is added to on-site work information. In such a case, one of the workers assigned to the "floor" cleaning is to inspect the power source equipment. In this case, therefore, the floors may not be satisfactorily cleaned.

Fig. 1 will be referred to again.

The work schedule information obtained in the on-site execution specifications forming section 15 in this manner is supplied to a work date data forming section 16. This work date data forming section 16 also receives information from an on-site work execution calendar file 17 and a work cycle file 18.

The one-site work execution calendar file 17 is used to store information of a work date required on each site together with site ID information. The

on-site work cycle file 18 is used to store cycle information, e.g., information based on a cycle of one week or three days, together with site ID information (see "date", "cycle", and "time zone" in Fig. 4).

In the work date data forming section 16, therefore, contents of works required for a given day, e.g., a required number of workers, work assignment of the respective workers, and a sequence of operations are obtained, and work contents on each site and work contents of each worker on a corresponding site are arranged.

That is, when a work file of works to be performed every day is to be formed, site ID information designating "every day" are detected from the one-site work execution calendar file 17, and one-site work information in Fig. 5 corresponding to this site ID information is read into the work file.

Note that the names (codes) of workers are not determined.

Determination of workers to be assigned will be described below.

Reference numeral 21 denotes a worker registration section in which information of each worker such as a worker code, a work type code, a working schedule, a working area, and technical abilities, and the performance index of each worker is registered. A performance index is formed on the basis of, e.g., the work result

of a worker for the following reason. Assume that the same work is to be done by different workers. Some workers may require a shorter period of time than other workers such as unskilled workers.

The information from this worker registration section 21 is input to an on-site worker registration section 23. In addition, the information from the on-site execution specifications forming section 15 is input to this on-site worker registration section 23. With this operation, workers suitable for work on the respective sites are selected and are arranged in units of sites. In this case, since working schedules are not considered, some workers may be assigned to a plurality of sites.

Fig. 6 shows a data format in the on-site worker registration 23. When a worker suitable for the power source equipment as a work target is to be selected, a worker having a qualification for inspection of power source equipment is selected with priority over other workers. With regard to "floor" cleaning, workers are sequentially selected in the order of decreasing performance index and are added to the respective site ID information as shown in Fig. 6. Fig. 6 shows a case wherein workers are sequentially arranged from the left to the right in Fig. 6 in the order of decreasing performance index. Each worker item shown in Fig. 6 includes the worker code, work type code, working

schedule, and working area of each worker. (With regard to the on-site worker registration, data update processing is performed as needed. Alternatively data update processing is performed in units of weeks or months.)

The information from this on-site worker registration section 23 is input to an on-site daily attending worker registration section 24. The section 24 also receives the information from the on-site work execution calendar file 17 and the work cycle file 18.

By using these information, therefore, a date to do work and workers who can attend a site can be obtained.

The information from the on-site daily attending worker registration section 24 and the information from the work date data forming section 16 are input to a worker assignment instruction determination/instruction note transfer section 30.

In the worker assignment determination/instruction note transfer section 30, the on-site ID information from the sections 24 and 16 are collated with each other, and work information and worker information associated with the on-site ID information are combined.

In addition, worker codes corresponding to the required number of workers are added to each on-site ID information. In this case, if an excessive number of workers are selected for the same work contents in the same time zone, they are compared with each other in

a priority item (e.g., "performance index") to select workers having higher priority. In this section, a lack of workers or excess workers can be detected. In addition, the required working time for the corresponding site can be corrected in accordance with the performance indexes of the workers. This is because the required working time is calculated on the basis of a corresponding standard working time in the on-site execution specifications forming section 15.

With this operation, the workers, the work contents, and the time zones (sequence) of the respective sites on the given day are assigned.

The worker assignment determination/instruction note transfer section 30 rearranges the information of work to be done by the workers and the time zones with reference to the respective worker codes.

Fig. 7 shows a data format showing a schedule of each worker. Workers H1 to H4 are to perform cleaning of the windows on the first floor of the building A1 from 7:00 to 18:00. From 18:00 to 20:00, the workers H1 to H3 are to perform cleaning of the floors on the first floor.

Data formed in this manner is transferred to a site interface 31 on each site. The site interface 31 prints out data including a worker code, work contents, and time zones (sequence) as an instruction note for each worker. Various methods of transferring data are

available, e.g., a method of using special lines and a method of using installed telephone lines.

The worker assignment determination/instruction note transfer section 30 also serves as a report receiving section for receiving information from the site interface 31.

When a worker attends a site, he/she causes a start registration section of the site interface 31 to read a card having his/her own specific code (ID card). When the worker finishes his/her work in accordance with a printed instruction note, he/she causes an end registration section to read his/her card.

When end registration is performed, the code of the worker is read by the report receiving section 30. With this operation, the working time of the worker, i.e., the time interval between the start of registration and the end of registration can be obtained, and the obtained data is transferred to a work result processing section 40. The work result processing section 40 checks whether the start and end of work are reported by a worker who is instructed to do the work on a given day. If they are reported, the section 40 checks whether an actual working time coincides with a standard working time.

The above-described data processing is performed by a computer in a system control section 50. A sequence of operations at each block is managed by this system

control section 50.

In addition, a worker can change his/her attendance schedule in the center through the site interface 31. If the worker inserts his/her card into the site interface 31 and depresses an attendance schedule change key, the interface inquires whether to shift, e.g., the commencement hour or the closing hour, or to take holidays. This inquiry is performed as a character display on a display screen. When the schedule is to be shifted, the commencement or closing hour is changed every time a commencement or closing hour shift key is depressed. When a registration key is depressed after this operation, the information of the worker is re-registered in an on-site worker master file 23. As a result, an instruction note for the following day will be issued after work plan correction with respect to the corresponding worker is automatically performed.

Fig. 8 shows another format of worker information registered in the on-site worker registration section 23. Assume that the worker H3 in the building A1 changes his/her possible attendance time zone from 17:00 - 20:00 into 9:00 - 12:00. On the following day, a worker H5 is selected by the on-site daily attending worker file 24 in place of the worker H3.

An embodiment of the present invention has the above-described arrangement. In the above-described system, data processing up to worker assignment can be

prepared by a simulation as long as the order file 14 and the worker informations are not changed. Therefore, workers can be assigned and a working site can be informed to each worker in the early morning of an actual work day or before the day. That is, data processing can be performed up to data processing in the work date data forming section 16 and the on-site daily attending worker registration section 24.

When each worker attends a corresponding site, he/she receives a printed instruction note. Therefore, he/she can do his/her own work in accordance with the instruction note.

Data formed in this system can be used in a variety of ways.

For example, at the time when the data of the on-site execution specifications forming section 15 is completed as shown in Fig. 4 or 5, calculation of a cost, estimation, prediction of expenses, or the like can be performed by multiplying a unit price corresponding to work contents by, e.g., the sum of working times.

Fig. 9 shows an arrangement of the work result processing section 40.

Work start data and work end data are supplied from each worker through a report input section 31 on a site together with a corresponding worker code. These data are stored in a work result file 401. In the work result file 401, an acutal working time of each worker

is calculated on the basis of the supplied data. By referring to the worker codes stored in the work result file 401, a working time of the corresponding worker is read out from an instruction file 405. Data of instruction working time of each worker formed in the instruction note transfer section 30 is held in the instruction file 405. This instruction working time and the actual working time are compared with each other by a comparing section 403 to calculate a difference. The difference is then stored in an execution result file 404 in units of workers. The data stored in this execution result file 404 is used to perform, e.g., statistical processing of data obtained when identical works are done by different groups of workers on the same site, or statistical processing of data obtained when identical works are done by the same group of workers on the same site. If a great difference is present between the instruction working time and the actual working time, the obtained data is used to re-evaluate the working cost. If work contents are irrelevant to differences in sex, working times required for male and female workers can be compared, and the obtained data can be used as reference data for efficient work assignment. For example, such data is used to correct a standard working time registered in the standard work registration section 12.

Although worker codes are present in the instruction

file 402, work start and end data may not be supplied from a worker. In such a case, it is determined that corresponding work is not executed, and corresponding data is registered in a work non-execution file 405.

The data (site and worker data) registered in the work non-execution file 405 is either displayed on a non-execution list display section 406 or printed out within the day.

In the non-execution file 405, it is checked whether the work is a cyclic work, i.e., a work registered in the cycle file shown in Fig. 1. This can be detected by collating site ID information associated with the non-executed work with site ID information in the work cycle file 18.

Once a cyclic work is left forgotten, the next designated work execution data sometimes comes after a long period of time, e.g., one or two weeks later. Such a long interval is not desirable. Therefore, if the cyclic work is forgotten, a cyclic work extracting section 407 transfers data consisting of the site and the date (the next date) to the calendar file 17. Upon reception of the data from the cyclic work extracting section 407, the calendar file 17 stores the data in a one-day record area. With this operation, if a cyclic work is forgotten and is not executed, the cyclic work is set in a work schedule in the work date data forming section 16 on the day next to the corresponding day.

However, since the calendar file 17 is programmed to clear cyclic work data when it is read out once, the data is not held in two days after the corresponding day.

In the above-described embodiment, result data obtained by executing work can be collected from each site through a network. With this operation, various types of analysis can be performed. For example, these data can be used to determine whether standard values (standard working times, standard costs, the number of workers, and the like) in units of sites, areas, and buildings are proper. In addition, correction of the standard values can be performed by using these average data. Furthermore, diagnosis of work on sites (e.g., excessive working times) can be performed by using on-site data and standard values. Moreover, since standard values can be obtained, estimation data of building management for a new client can be easily formed.

As has been described above, according to the present invention, there is provided a building maintenance management system which can reliably supply proper work contents to each worker on each site.

The above-described data processing and data processing for the respective purposes in each block can be performed by executing programs stored in the system control section 50. These programs are constituted by data collation, extraction, and storage functions and

an arithmetic operation function.

Figs. 10 to 15 are flow charts of programs used by the system control section 50 in each block.

Fig. 10 is a flow chart for forming standard work data in the standard work registration section 12. The data shown in Fig. 3 is to be formed in a memory A. A standard working time is input or corrected through the system control section 50 by operating a keyboard while referring to displayed data.

Fig. 11 is a flow chart for forming on-site information in the on-site work registration section 13. The data shown in Fig. 4 is to be formed in a memory B. This data may be input by a user through the keyboard.

Fig. 12 is a flow chart of a program used in the on-site execution specifications forming section 15. In this section, standard work information on each site is formed. In addition, a total working time, i.e., a total number of workers is calculated on the basis of areas and standard working times. The obtained data is then stored in a memory C.

Fig. 13 is a flow chart of a program used in the on-site execution specifications forming section 15. In this case, data in a memory C is displayed. More specifically, in this case, work contents of the same building, the same date, and the same time zone, and a total number of workers are displayed. The user can correct a sequence of operations, assignment of working

times, and the number of workers. Such data input is performed through the keyboard.

With this operation, the data shown in Fig. 5 is formed and stored in a memory D.

Fig. 14 is a flow chart used in the work date data forming section 16. Date data is read out from the calendar file 17, and work information corresponding to the read date data is read out from the memory D. The data is then stored in a memory E.

Fig. 15 is a flow chart of a program used in the worker assignment determination/instruction note transfer section 30.

Site ID data is read out from the memory E is collated with site ID data from the attending worker registration section. When they coincide with each other, workers corresponding to the required number of workers stored in the memory E are selected. The selected worker codes and corresponding work information in the memory E are combined and stored in a memory F. The data from the memory F is transferred to a terminal on a corresponding site.

Claims:

1. A building maintenance management system comprising:

means for forming work schedule information for each site, the work schedule information including a work target on a site, a time required for the work, and a required number of workers;

means for forming worker information representing workers who can work on each site, the worker information including time information representing time intervals in which the respective workers can work; and

means for selecting workers and transferring an instruction note, said means collating the work schedule information with the worker information, selecting workers required for each site from the worker information, and transferring a code of each selected worker and work schedule information thereof to a corresponding site.

2. A building maintenance management system comprising:

an on-site execution specifications forming section for storing data obtained by adding to on-site ID information a work target for building maintenance, time information of work to be done for the work target, and work schedule information consisting of, e.g., information representing a required number of workers assigned to the work target and a date on which the work

is to be executed;

an on-site work execution calendar section for storing data obtained by adding work date information of a site corresponding to the site ID information to the site ID information;

a work date data forming section for extracting site ID information representing that works are to be executed on the same date from a plurality of site ID information in said on-site work execution calendar section, extracting the work schedule information of the corresponding site from said on-site execution specifications forming section on the basis of the extracted site ID information, and storing the corresponding work schedule information together with the side ID information;

an on-site worker registration section for storing worker information, said on-site worker registration section storing the site ID information and worker information representing workers who can attend a site corresponding to the site ID information, and the worker information including at least time information representing time zones in which the respective workers can attend;

an attending worker registration section for extracting site ID information, in which works are planned at the same date, from said on-site work execution calendar section, extracting worker information of

a site corresponding to the extracted ID information from said on-site worker registration section, and storing the ID information together with the corresponding worker information; and

a worker assignment determination/instruction note transfer section for receiving the information from said attending worker registration section and from said work date data forming section, selecting attending workers added to corresponding site ID information by a required number of workers included in the work schedule from said work date data forming section, and transferring work instruction data obtained by adding a work target and a working time zone to a code of each attending worker to a corresponding site terminal.

3. A system according to claim 2, wherein said terminal includes a result data input section for performing registration of a work start upon attendance of a worker and registration of a work end upon completion of the work, and means for transferring result data (including a worker code and work start and end time information) from said result data input section to a result processing section.

4. A system according to claim 3, wherein said result processing section includes means for comparing the worker code with work information by using the work instruction data from said worker assignment determination/instruction note transfer section and the

transferred result data, and detecting the transferred worker code and non-transferred worker code, thereby forming a data file of a site on which work is not done.

5. A system according to claim 4, wherein said result processing section includes means for detecting a site on which work is required to be done cyclically from site ID information representing sites on which works are not executed and information from said on-site cycle file, and causing a work date storage section to store the detected site as execution data for the following day.

6. A building maintenance management system comprising:

a standard work registration section for classifying and storing various types of work targets of a building, each work target being combined with a standard time, and each standard time being considered as a working time required for a work of a unit area of a corresponding work target per worker;

an on-site work target registration section for classifying and storing buildings and sites thereof, each of pieces of classified site ID information being combined with at least first work information including a work target required on the site, an area of the work target, a date on which corresponding work is to be done, a time zone in which the work is to be done, and the like;

an on-site execution specifications forming section for receiving information from said standard work registration section and from said on-site work target registration section, and for classifying and storing buildings and sites thereof, each of the pieces of classified site ID information including the work target, a working time zone for the work target, and the number of workers required for the work, and the number of workers required for the work being calculated on the basis of the corresponding standard time, an area of the work target, and a working time;

an on-site work execution calendar section for storing each of the pieces of classified site ID information to which a corresponding work date is added;

a work date data forming section for receiving information from said on-site work execution calendar section and from said on-site execution specifications forming section, and for extracting site ID information representing that works are to be done on the same date from said on-site work execution calendar section, extracting second work information of a site corresponding to the site ID information from said on-site execution specifications forming section, adding the second work information to each site ID information, and storing the resultant information;

on-site worker registration section for storing the classified site ID information and worker information

representing workers who can attend sites corresponding to the site ID information, the worker information including at least time information representing a time zone in which each worker can attend a corresponding site;

an attending worker registration section for receiving information from said on-site work execution calendar section and from said on-site worker registration section, and for extracting site ID information representing that works are to be done on the same date from said on-site work execution calendar section, selecting worker who can attend the side on a date and in a time zone required for the site on the basis of the extracted site ID information, and storing a combination of the work information and the corresponding site ID information; and

a worker assignment determination/instruction note transfer section for receiving information from said attending worker registration section and from said work date data forming section, and for selecting attending workers combined with site ID information corresponding to the second work information by a required number of workers included in the second work information from said work date data forming section, and adding a corresponding work target and a working time zone to a code of each of the attending workers, and transferring the resultant information to a terminal on the

corresponding site.

7. A building maintenance management system, substantially as hereinbefore described with reference to the accompanying drawings.